VII. SUMMARY

Monitoring of seasonal influences, the effect of housing conditions and domestication on the horn quality of the equine hoof.

In a yearlong field trial the effects of season, housing conditions, nutrition and domestication on the horn quality of the equine hoof were studied. The trial included twenty horses of two different housing systems with clinically asserted good and poor hoof horn quality. The sampling of hoof clippings and measurement of the hoof shape took place at regular intervals in line with the farriery. Furthermore, blood samples, hoof photos and samples of feedstuff were taken on three occasions. Laboratory analysis included physical material examination (water content and horn hardness), light- and scanning electron microscopy, analysis of the fatty acid content of hoof horn and feedstuff via gas chromatography as well as determination of the mineral and trace element status in the blood. In addition, a scoring for an objective assessment of the hoof horn quality was designed. Also the rate of horn production and changes in body weight were determined. Thus, the diversity of the methods employed in the study allowed to judge the interactions of the various factors affecting the horn quality.

During the investigation period minor variations of the hoof shape were detected. In comparison with the Przewalski horse (SCHNITKER, 2004) these changes could not be associated with a certain season as they were a result of farriery. Compared to the Przewalski horses the hooves displayed an obtused angle.

As described for the Przewalski horse (SCHNITKER, 2004) the rate of horn production was clearly reduced in winter in both stables.

Seasonal changes in the water content of the hoof horn and horn hardness were also asserted and these were related to the housing system. In open stable housing the horses possessed the highest horn hardness in summer whereas the least hardness was measured in winter. On the other hand the water content was highest in wintertime. In contrast such seasonal changes could not be observed in indoor housing.

Concerning the architecture of the hoof horn no seasonal changes were seen by means of light- and scanning electron microscopy. The architecture of the tubular as well as the lamellar horn was constant within the entire investigation period.

An increased incidence of macroscopic and microscopic cracks in the hoof horn was detected in summer. Those cracks appeared frequently in association with a low humidity of the environment and brittle horn. Break-outs at the weight-bearing margin appeared more often in

summer than in winter. Physiological horn rings were observed all year round, primarily in the hooves of horses and ponies in open stable housing. These horn rings were more dinstictive in summertime.

Using gas chromatography slight seasonal changes in the fatty acid composition in hoof horn and feedstuff were detected. In feedstuff predominantly unsaturated fatty acids were found, whereas in hoof horn near the weight-bearing margin saturated fatty acids dominated. The total concentration of fatty acids in feedstuff and hoof horn declined simultaneously, but a difference in the fatty acid composition between good and inferior horn quality was not asserted.

Several aspects of ageing of the coronary horn near the weight-bearing margin were observed. This appeared in an increased formation of cracks, a frequent lack of the tubular medulla and supposably a reduced concentration of fatty acids in the hoof horn.

All blood parameters flucutated in the course of one year. Distinct differences between the two housing conditions did not exist. Furthermore most horses showed a zinc, copper and selenium deficiency but this deficiency was not associated with inferior horn quality. However, there was a negativ correlation between changes of the serum selenium concentration and serum zinc concentration respectively and changes in hoof horn hardness over the period of one year.

Also the influence of the horse`s age, gender and breed as well as the pigmentation of the hoof horn on its quality was assessed. However, these factors were only an underpart and individual fluctuations of the hoof horn quality were more distinct.

In conclusion the hoof horn quality of domesticated horses is subject to a multitude of seasonal changes. These show a number of similarities to the wild living Przewalski horse but lessened in the course of domestication. Also considerable differences concerning the horn quality among the two housing systems were detectet. Thus, the equine hoof clearly reflects the versatile factors of influence.